Title: Sustainable antimicrobial functionalization of cotton with lavender oil and jackfruit latex.

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Abstract: In recent years, functional antimicrobial fabric materials have been in high demand in the health sector due to the impact of COVID-19. Considering the increasing demand, the availability of natural, environmentally friendly, and non-toxic products is limited. In this study, a facile, eco-friendly method for the preparation of antimicrobial functional cotton fabric is proposed. At first, scoured and bleached cotton fabric is treated with chitosan, followed by encapsulation of lavender essential oil (LEO) with the addition of Artocarpus heterophyllus Lam. (jackfruit) latex gum as a binder. For the encapsulation and optimization of LEO and jackfruit latex gum (JLG) performance, four variations of these material's quantity were utilized. Among all the studied samples, we found that the most efficient inhibition of bacterial growth was induced in both gram-negative (Escherichia coli) and gram-positive (Staphylococcus aureus) cultures. Among the samples, the chitosan-treated fabric with LEO and JLG added, named TG-5 (refers to LEO of 3 mL and JLG of 5 mL), showed the most impactful bacteria reduction. It demonstrates the most effective antibacterial reduction of 92.5% and 56.8% for E. coli and S. aureus bacterium cultures, respectively. The field emission scanning electron microscope illustrates and validates the morphology and addition of the prepared samples, while Fourier transform infrared is employed to identify the chemical bonding and chemical compounds of the functionalized materials. Therefore, the new combination of lavender oil and latex gum of jackfruit as an antimicrobial finishing agent can be the replacement of synthetic chemicals for cotton fabric functionalization in medical textiles.

Keyword: Antibacterial Features, Binder, Chitosan-Modification, Cotton Fabric, Eco-Friendly, Jackfruit Latex Gum, Sustainability, UN SDG 12: Responsible Consumption and Production.

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